BrightFields, Inc.

Appendix 22-A

PURINA A TOWER
WILMINGTON, DELAWARE

SIRB ID: DE-1263

BrightFields, Inc.

GENERAL SITE INFORMATION

Site Name: Purina A Tower

SIRB ID Number: DE-1264

Site Location and Description: The Purina Tower A site consists of one tax parcel located just outside the City of Wilmington limits in New Castle County (06-152.001-001). The site was formerly the Ralston Purina Company, which manufactured domestic animal food. Three buildings remain on the property; the original concrete grain silos used by the Ralston Purina Company, an administration building, and a recently constructed masonry block truck garage. Currently the site is in use as a bus storage facility for the Brandywine School District.

Previous Site Uses: Between 1941 and 1944, the Ralston Purina Company, Inc. purchased the property, which consisted of four parcels in total. Prior to the purchase of the property by Purina, the site is suspected to have been a municipal landfill for the City of Wilmington.

Site Regulatory Status: This section briefly summarizes previous investigations performed on the site through the SIRB program. A current SIRB regulatory status is also included.

Brownfields Preliminary Assessment II (BPA) of the Purina Tower A

- As part of this BPA, DNREC collected 26 soil samples from borings, which included monitoring well installation borings. All of the soil samples were field screened in a DNREC mobile laboratory. Subsequently, five soil samples were chosen for fixed laboratory analysis based on the screening results. Soil samples across the site exhibited elevated concentrations of both inorganics and organics. The primary constituents of concern across the site were PAHs, which were detected in all samples above the residential benchmarks.

- In an effort to characterize site groundwater, two wells were installed and sampled. Samples were sent to STL-Envirotech Laboratory, Edison, New Jersey to be analyzed for a full suite of parameters. The results indicated that there were elevated concentrations of VOCs within site groundwater above the Drinking Water and United States Environmental Protection Agency (EPA) Maximum Contaminant Level (MCL) values.

SUMMARY OF SITE PCB INFORMATION

Site Investigation PCB Findings:

Total PCBs (Aroclor-1254 and Aroclor-1260) were detected in two surface soil samples at concentrations ranging from 0.23 mg/kg to 0.72 mg/kg. There were no detections of PCBs in the subsurface soils on the Purina Tower "A" property. Due to the insufficient number of samples collected from the surface soil, BrightFields had to assume that the entire site has been impacted by PCBs. During the site evaluation BrightFields identified two distinct areas that may still be contributing to mass loading via overland flow; part of the site had been paved since the original sampling. Area 1 was identified in the northwest corner and Area 2 was located in the southeast corner.

Due to the insufficient number of distinct detections in the surface soil, BrightFields used the maximum detected value in performing the calculations for overland flow instead of calculating a 95% UCL of the mean. PCBs were not detected in the subsurface saturated soils.

Concentrations of PCBs on Site			
Sample Matrix	**Corresponding Figure**	**Analytical Methods**	**Range of Total PCBs**
Surface Soil	Figure 2	Method 8082	Not detected to 0.72 mg/kg
Subsurface Soil (unsaturated)	Figure 3	Method 8082	Not detected
Subsurface Soil (saturated)	Figure 4	Method 8082	Not detected
Ground Water	Figure 5	Method 8082	Not detected

A summary of all samples collected for PCBs are presented in the attached Tables 1 through 2.

Acreage where PCBs detected:

Total area of surface soil impacted by PCBs is 3.58 acres of which only 1.38 acres may still be contributing to PCB mass loading via overland flow. The remaining 2.30 acres is currently under an impervious surface. During the historical review of the site there were no PCBs found in the subsurface saturated soil or groundwater.

PCB Remediation Status:

There have been no remedial activities required or taken place on site.

PCB MASS LOADING SUMMARY

The PCB mass loading rate to surface water via overland flow is discussed below. There were no reported concentrations of PCBs in the subsurface saturated zone or in the groundwater; therefore, groundwater transport is not considered a mechanism of transport for PCBs at this site. A summary of the results is included below and the details of the calculations are included as attachments to this Appendix.

OVERLAND FLOW:

Overland flow has been determined on this site by using the Revised Universal Soil Loss Equation (RUSLE). The RUSLE predicts the long term average annual rate of erosion on an area based on rainfall patterns, soil type, topography, cover/canopy factors and support management practices. These specific factors are site specific and rely on local information of the site. A breakdown of the individual factors is presented below with a brief explanation of their choice.

Ground Cover and Canopy:

A site inspection was performed on November 11, 2008 to estimate the current site ground cover and canopy. The cover/management factor (C) assigned to the site and associated flow path is 0.033 to 0.052, which corresponds to areas of bare ground that include a stone cover of at least five inches thick and areas of vegetation that consist primarily of weeds. Photographs of the site ground cover and canopy are attached.

Site Sediment and Erosion Control Practices:

There are no sediment and erosion controls in place.

Input Factors and Results:

A breakdown of the individual factors is presented below with a brief explanation of their choice.

Purina Tower "A" Area 1

RUSLE Factors	Values Provided	Explanation of Selection
E = rainfall/erodibility index (10^2 m-tonne-cm/ha-hr)	170	An appropriate value for E for the site was determined from plots of E for the Eastern U.S. (Wischmeier and Smith, 1978).

RUSLE Factors	Values Provided	Explanation of Selection
K = soil erodibility (tonne/ha per unit of E)	0.28	The soil erodibility factor was chosen based on the information provided by the boring log represented for MWB-2 in the BPA II for Purina Tower "B" (DNREC 2002).
ls = topographic factor (dimensionless)	0.220	The slope length was estimated to 708 feet, which is the distance between the centroid and the closest surface water body along the overland flow path. The assumed slope (1.41 %) and slope length were used to calculate a topographic factor of 0.220 from the USGS windows based application.
C = cover/management factor (dimensionless)	0.033	The cover/management factor C assigned to the site by the USGS windows based application was 0.033, which corresponds to bare ground with stone cover at least five inches thick.
P = support practice factor (dimensionless)	1.0	There are currently no support practice factors being implemented on the Purina Tower "A" site.

The average annual erosion rate is based on the windows based RUSLE2 program (RUSLE2 License, version 2006-Jul-24).

The total PCB loading via overland flow for Area 1 is 0.3 grams per year. Please see attached table for specific variables.

Purina Tower "A" Area 2

RUSLE Factors	Values Provided	Explanation of Selection
E = rainfall/erodibility index (10^2 m-tonne-cm/ha-hr)	170	An appropriate value for R for the site was determined from plots of Rainfall patterns for the Eastern U.S. (Wischmeier and Smith, 1978).
K = soil erodibility (0.01 tonf acre hr/acre ft-ton in)	0.36	The soil erodibility factor was chosen based on the information provided by the boring log represented for MWB-2 in the BPA II for Purina Tower "B" (DNREC 2002).
ls = topographic factor (dimensionless)	0.230	The slope length was estimated to 537 feet, which is the distance between the centroid and the closest surface body water along the overland flow path. The assumed slope (1.5 ft/ft) and slope length were used to calculate a topographic factor of 0.230 from the USGS windows based application.

RUSLE Factors	Values Provided	Explanation of Selection
C = cover/management factor (dimensionless)	0.052	The cover/management factor C assigned to the site by the USGS windows based application was 0.052, which corresponds to bare ground with stone cover at least five inches thick.
P = support practice factor (dimensionless)	1.0	There are currently no support practice factors being implemented on the Purina Tower "A" site.

The average annual erosion rate is based on the windows based RUSLE2 program (RUSLE2 License, version 2006-Jul-24).

The total PCB loading via overland flow for Area 2 is 0.005 grams per year. Please see attached table for specific variables.

Uncertainty Evaluation:

Specific Areas and Degree of Uncertainty for the Purina Tower "A" Site

	Samples Per Acre (site)	Chemical Data Quality*	Topography	Soil Type	Site Coverage	Map Quality	Distance to Discharge Points
Site Specific Information	0.6	Method 8082	Estimated using topography and site inspection	Detailed logs that are located off-site.	Based on a thorough site assessment	Scaled Map	708 feet 537 feet
Degree of Uncertainty	High	Moderate to High	Moderate to High	High	Low	Moderate to High	High

* Primary analysis used in the historical samples

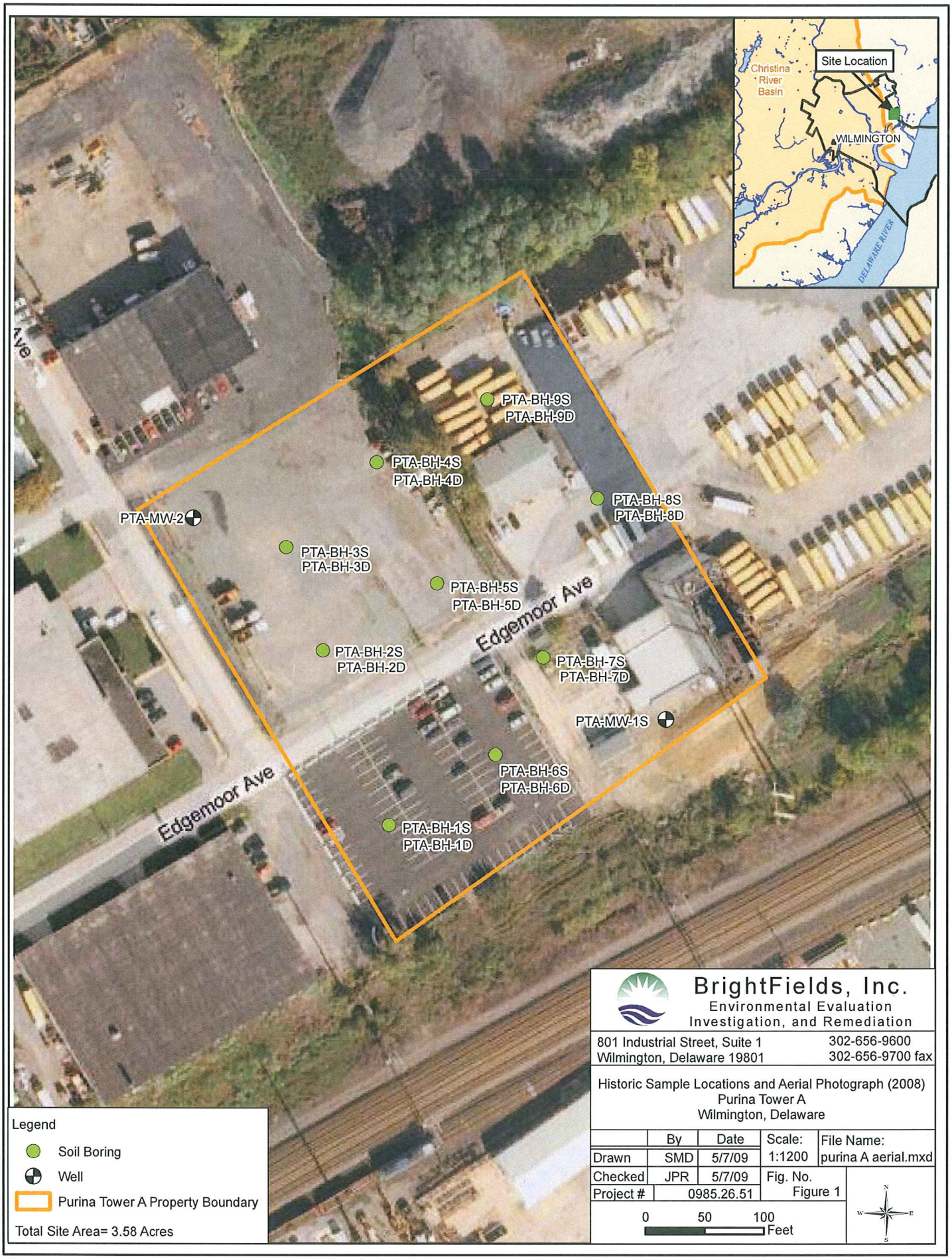
Sources of uncertainty for Purina Tower "A" site include the following: topography in the area is not well defined because the site falls just inside the City of Wilmington limits, so the area surrounding the property does not have any spot elevations. PCB data was very limited on the site because screening data associated with the samples was not available in DNREC's files. In the toxicological report issued by DNREC in 2002, there is mention that the screening analysis reported elevated concentrations of PCBs in the surface soils, but this could not be incorporated into our assessment. The sample location figures for the site were very limited and did not demonstrate the same nomenclature as the tables and analytical packages. Due to these evaluations the overall uncertainty associated with the Purina Tower "A" site is **moderate to high**.

Site References:

Department of Natural Resources and Environmental Control (DNREC), 2002, Toxicological Evaluation for the Purina Tower "A" Site, Wilmington, DE, September 2002.

DNREC, 2002, Brownfield Preliminary Investigation II of the Purina Tower "A" Site, September 2002.

Figures



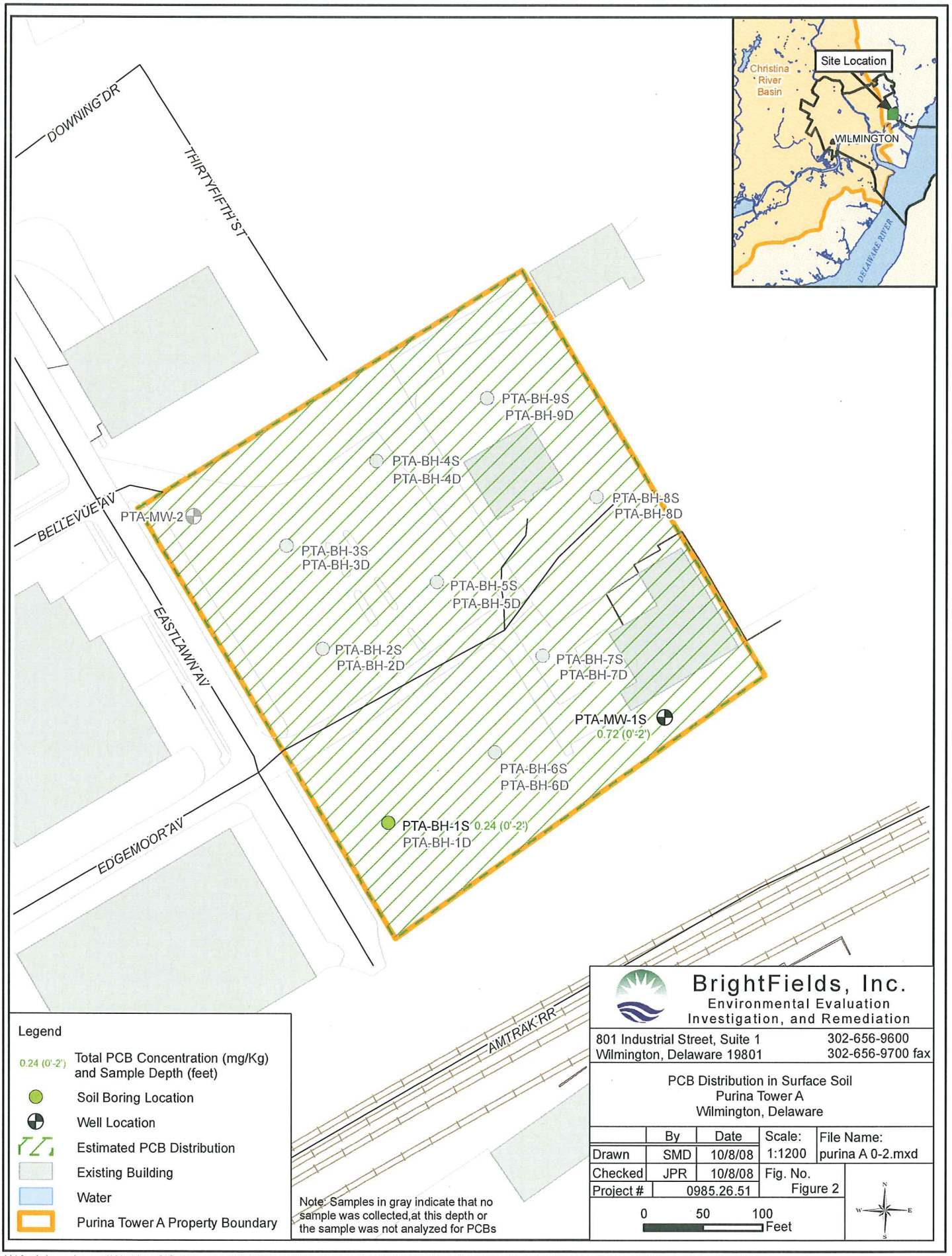
BrightFields, Inc.
Environmental Evaluation
Investigation, and Remediation
801 Industrial Street, Suite 1
Wilmington, Delaware 19801
302-656-9600
302-656-9700 fax

Historic Sample Locations and Aerial Photograph (2008)
Purina Tower A
Wilmington, Delaware

	By	Date	Scale:	File Name:
Drawn	SMD	5/7/09	1:1200	purina A aerial.mxd
Checked	JPR	5/7/09	Fig. No.	Figure 1
Project #	0985.26.51			

0 50 100 Feet

N:\Aerials and maps\Working GIS Files (Do Not Edit)\51 General Consulting\0985.26.51- PCB Mass Loading\Purina Tower A\mxds\purina A_aerial.mxd

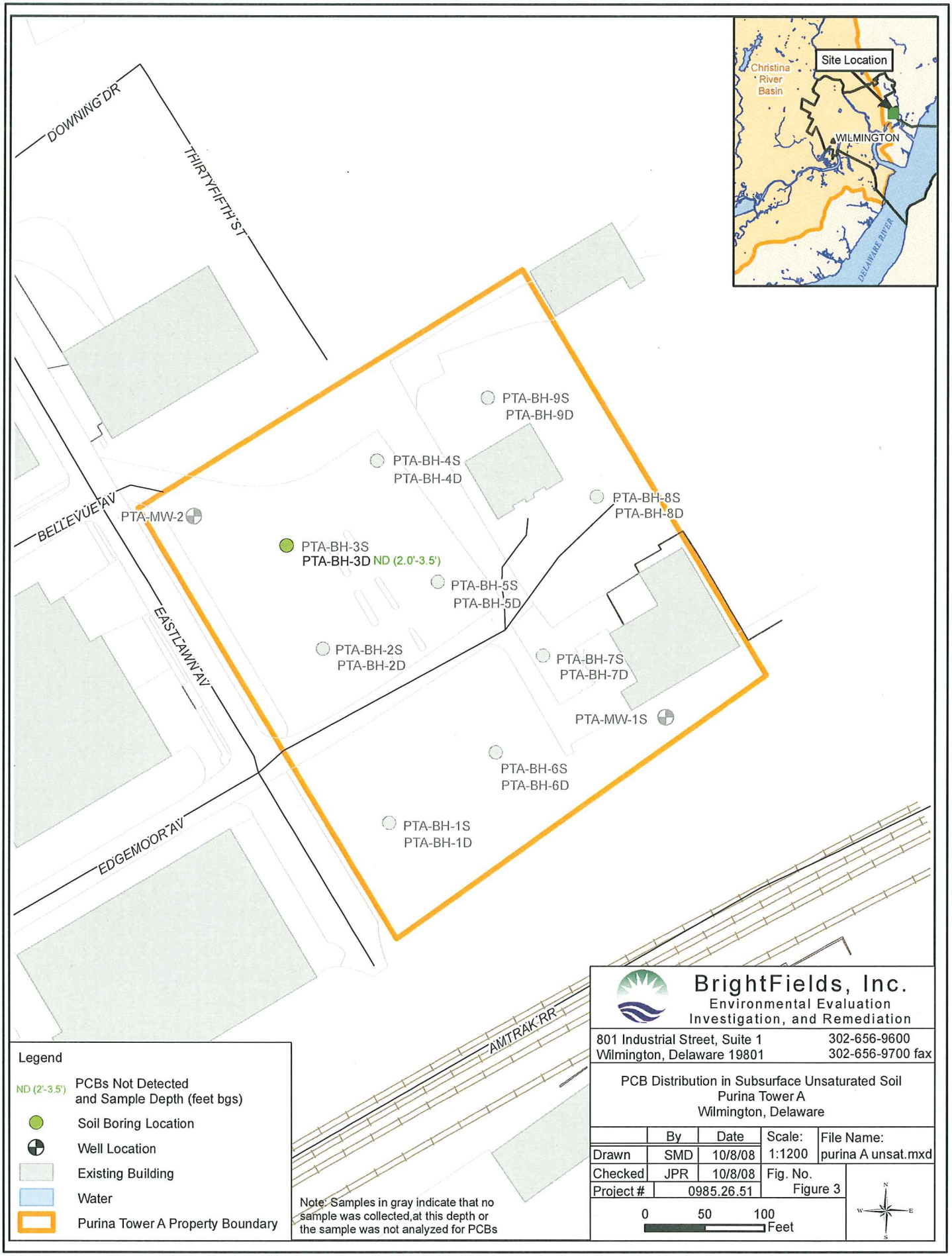


BrightFields, Inc.
Environmental Evaluation Investigation, and Remediation
801 Industrial Street, Suite 1
Wilmington, Delaware 19801
302-656-9600
302-656-9700 fax

PCB Distribution in Surface Soil
Purina Tower A
Wilmington, Delaware

	By	Date	Scale:	File Name:
Drawn	SMD	10/8/08	1:1200	purina A 0-2.mxd
Checked	JPR	10/8/08	Fig. No.	Figure 2
Project #	0985.26.51			

N:\Aerials and maps\Working GIS Files (Do Not Edit)\51 General Consulting\0985.26.51- PCB Mass Loading\Purina Tower A\mxds\purina A_0-2.mxd



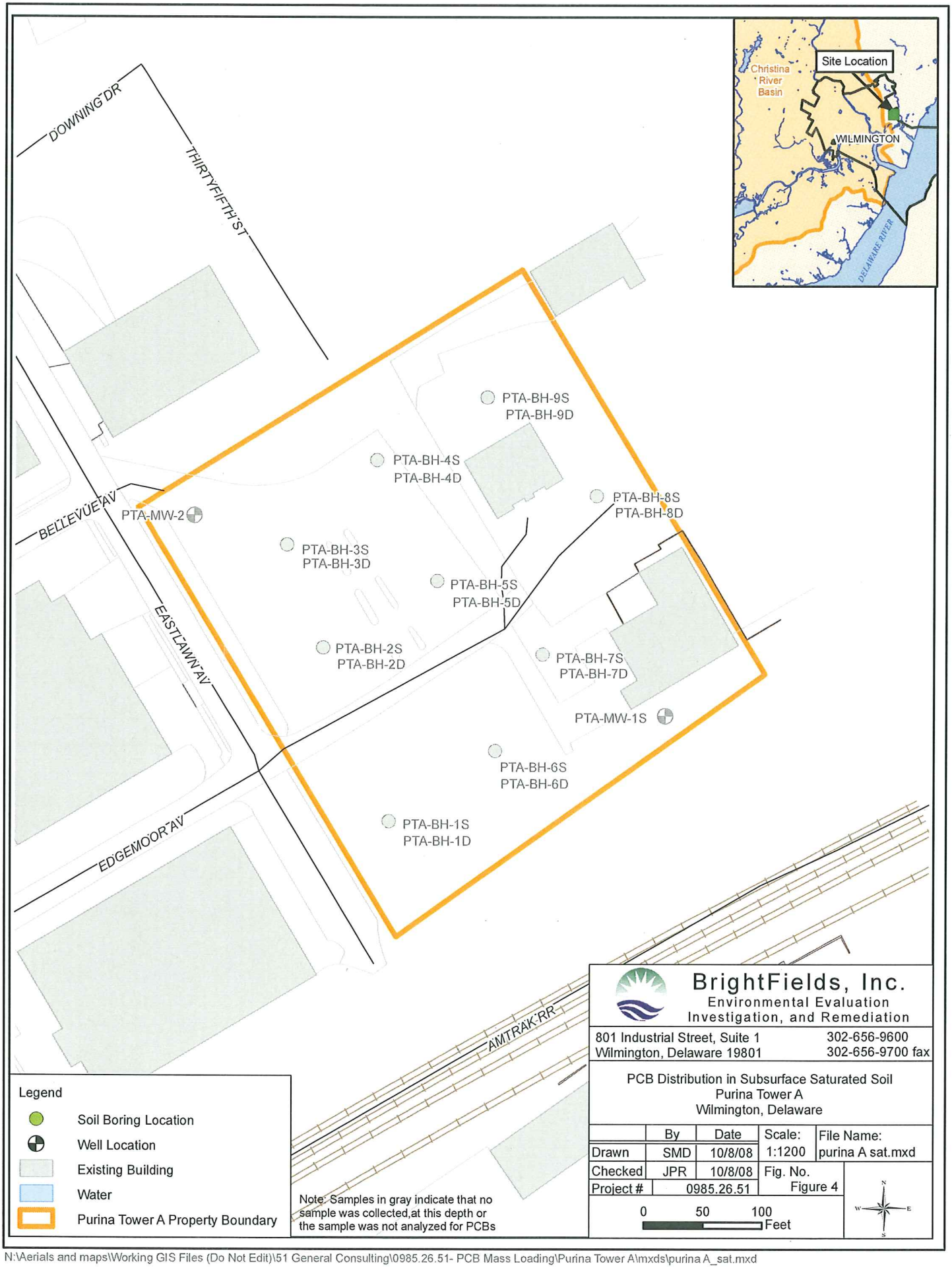
BrightFields, Inc.
Environmental Evaluation
Investigation, and Remediation

801 Industrial Street, Suite 1
Wilmington, Delaware 19801
302-656-9600
302-656-9700 fax

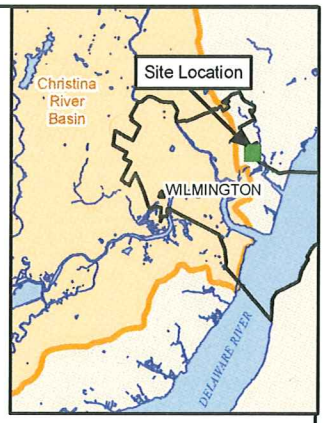
PCB Distribution in Subsurface Unsaturated Soil
Purina Tower A
Wilmington, Delaware

	By	Date	Scale:	File Name:
Drawn	SMD	10/8/08	1:1200	purina A unsat.mxd
Checked	JPR	10/8/08	Fig. No.	
Project #	0985.26.51		Figure 3	

N:\Aerials and maps\Working GIS Files (Do Not Edit)\51 General Consulting\0985.26.51- PCB Mass Loading\Purina Tower A\mxds\purina A_unsat.mxd



N:\Aerials and maps\Working GIS Files (Do Not Edit)\51 General Consulting\0985.26.51- PCB Mass Loading\Purina Tower A\mxds\purina A_sat.mxd



DOWNING DR
THIRTYFIFTH ST
BELLEVUE AV
EASTLAWN AV
EDGEMOOR AV
AMTRAK RR
PTA-MW-2
ND
PTA-MW-1
ND

Legend

ND	PCBs Not Detected
	Well Location
	Existing Building
	Water
	Purina Tower A Property Boundary

Note: Samples in gray indicate that no sample was collected,at this depth or the sample was not analyzed for PCBs

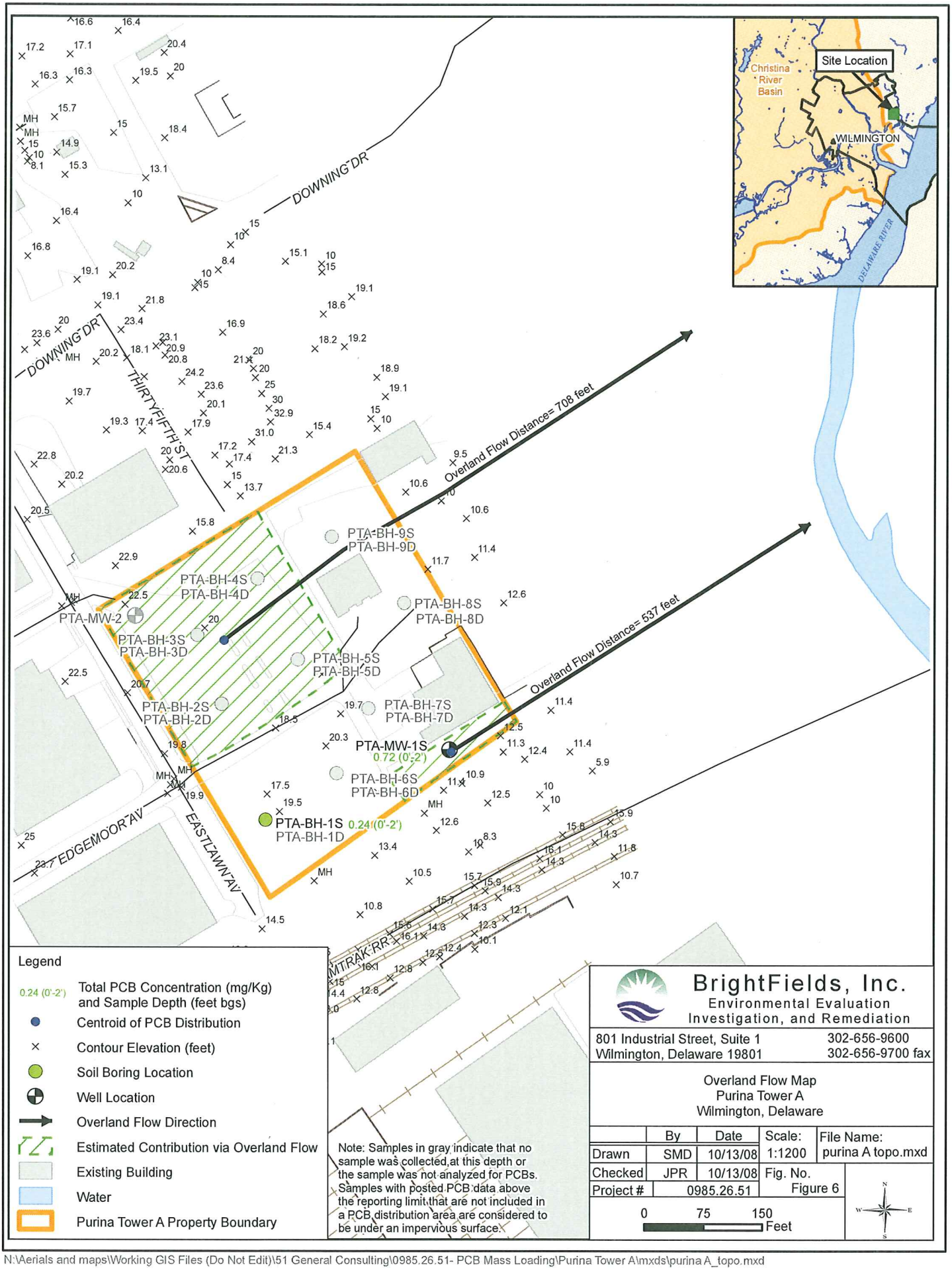
BrightFields, Inc.
Environmental Evaluation
Investigation, and Remediation
801 Industrial Street, Suite 1
Wilmington, Delaware 19801
302-656-9600
302-656-9700 fax

PCB Distribution in Groundwater
Purina Tower A
Wilmington, Delaware

	By	Date	Scale:	File Name:
Drawn	SMD	10/8/08	1:1200	purina A gw.mxd
Checked	JPR	10/8/08	Fig. No.	
Project #	0985.26.51		Figure 5	

0 50 100 Feet

N:\Aerials and maps\Working GIS Files (Do Not Edit)\51 General Consulting\0985.26.51- PCB Mass Loading\Purina Tower A\mxds\purina A_gw.mxd



N:\Aerials and maps\Working GIS Files (Do Not Edit)\51 General Consulting\0985.26.51- PCB Mass Loading\Purina Tower A\mxds\purina A_topo.mxd

Tables

Table 1
PCB Analytical Results For Soil
Purina Tower "A" Property
Wilmington, DE
SIRB ID: DE-1103

Sample ID Sampling Depth (feet bgs) Sampling Date Units Report Issued	DNREC URS for Protection of Human Health Non-critical Water Resource Area mg/Kg		PTA-BH-1S 0'-2' 4/18/2002 mg/Kg DNREC (2002)		PTA-MW-1S 0'-2' 4/17/2002 mg/Kg DNREC (2002)		PTA-BH-3D 2.0'-3.5' 4/19/2002 mg/Kg DNREC (2002)	
	Unrestricted Use	Restricted Use						
PCBs								
Aroclor-1016	5	82	0.083	U	0.08	U	0.014	U
Aroclor-1221	0.3	3	0.083	U	0.08	U	0.014	U
Aroclor-1232	0.3	3	0.083	U	0.08	U	0.014	U
Aroclor-1242	0.3	3	0.083	U	0.08	U	0.014	U
Aroclor-1248	0.3	3	0.083	U	0.08	U	0.014	U
Aroclor-1254	0.3	3	0.083	U	0.5		0.014	U
Aroclor-1260	0.3	3	0.23		0.22		0.014	U
Aroclor-1262	nca	nca	0.083	U	0.08	U	0.014	U
Aroclor-1268	nca	nca	0.083	U	0.08	U	0.014	U

DNREC (2002) - Brownfield Preliminary Assessment of Purina Tower "A" (September 2002).

Qualifiers
U - The compound was not detected above the indicated laboratory detection limit
NR - Not analyzed
ND - Not Detected, but reporting limit could not be found for sample
nca - no criteria available
bold - concentration is above DNREC URS unrestricted use criteria
shaded - concentration is above DNREC URS restricted use criteria

Table 2
PCB Analytical Results For Groundwater
Purina Tower "A" Property
Wilmington, DE
SIRB ID: DE-1103

Sample ID Sampling Date Units Report Issued	DNREC URS for Protection of Human Health ug/L	PTA-MW-2 5/1/2002 ug/L DNREC (2002)		PTA-MW-1 5/1/2002 ug/L DNREC (2002)	
PCBs					
Aroclor-1016	0.1	0.5	U	0.5	U
Aroclor-1221	0.03	0.5	U	0.5	U
Aroclor-1232	0.03	0.5	U	0.5	U
Aroclor-1242	0.03	0.5	U	0.5	U
Aroclor-1248	0.03	0.5	U	0.5	U
Aroclor-1254	0.03	0.5	U	0.5	U
Aroclor-1260	0.03	0.5	U	0.5	U
Aroclor-1262	nca	0.5	U	0.5	U
Aroclor-1268	nca	0.5	U	0.5	U

DNREC (2002) - Brownfield Preliminary Assessment II of the Purina "A" Tower (July 2002).

Qualifiers
U - The compound was not detected above the indicated laboratory detection limit
NR - Not analyzed
nca - no criteria available
bold - concentration is above DNREC URS unrestricted use criteria
shaded - concentration is above DNREC URS restricted use criteria

PCB Loading Calculations from the Universal Soil Loss Equation
Purina Tower "A" (Area 2)
Wilmington, DE
DE-1263

Surface PCB Concentration | 0.72 | mg/kg

Symbol	Factor	Value	Units
R	Rainfall/Runoff Erosivity Index	170	10^2 ft-tonf in/acre hr
K	Soil Erodibility	0.36	0.01 tonf acre hr/ac ft-ton in
	Estimated Slope Length	537	Feet
	Estimated Elevation Difference	8.1	Feet
	Slope	1.51	Percent
	Erodeable Area	0.13	Acres
LS	Topographic Factor	0.230	Dimensionless
C	Cover and Management Factor	0.052	Dimensionless
P	Support Practice Factor	1	Dimensionless
	Average Annual Soil Loss	0.05	ton/ac/yr

PCB Loading via Overland Flow | 0.005 | **grams/year - PCBs**

PCB Mass Loading
Purina A Tower
SIRB ID: DE-1263
Wilmington, Delaware

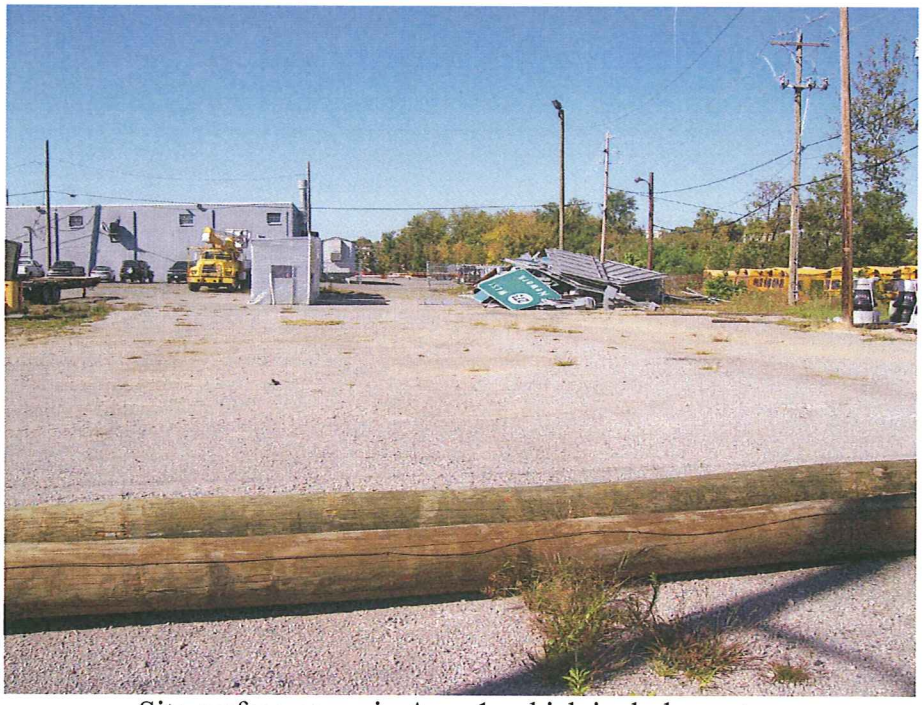
BrightFields, Inc.

Site Photographs

BrightFields, Inc.

PCB Mass Loading Evaluation
Purina Tower "A"

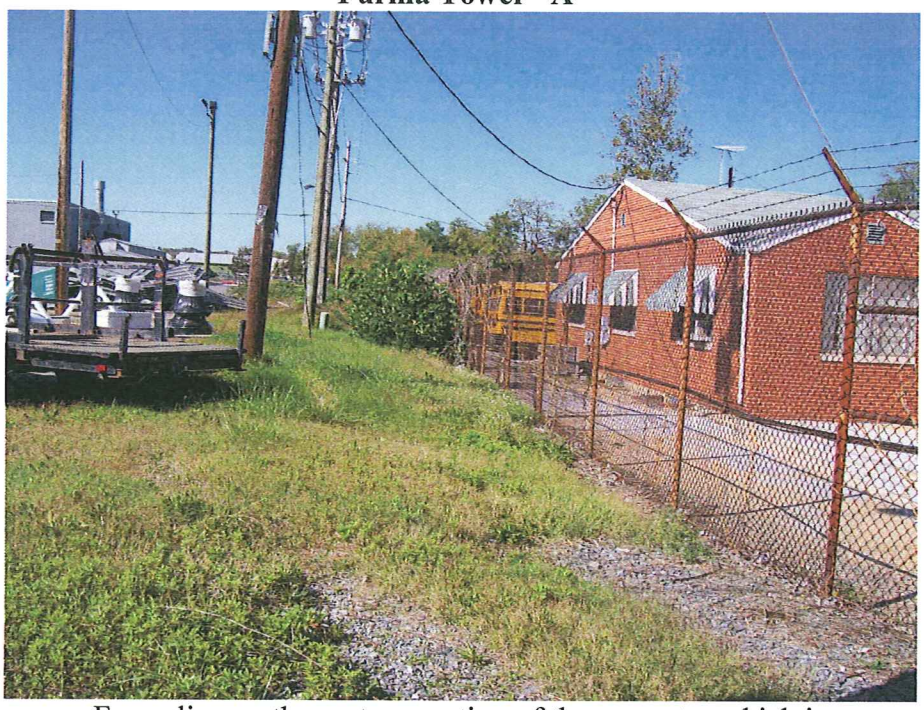
New asphalt parking lot located on the southeast portion of the property.



Site surface cover in Area 1, which includes a stone cover estimated at a thickness of five inches.

BrightFields, Inc.

PCB Mass Loading Evaluation
Purina Tower "A"



Fence line on the eastern portion of the property, which is preventing access to portions of the site.

Area 2 site surface cover consisting primarily of short brush and weeds.

BrightFields, Inc.

PCB Mass Loading Evaluation
Purina Tower "A"

Overland flow path for Area 2.

Newly constructed cell tower office located on southeastern portion of the site.

PCB Mass Loading
Purina A Tower
SIRB ID: DE-1263
Wilmington, Delaware

BrightFields, Inc.

Overland Flow Calculations

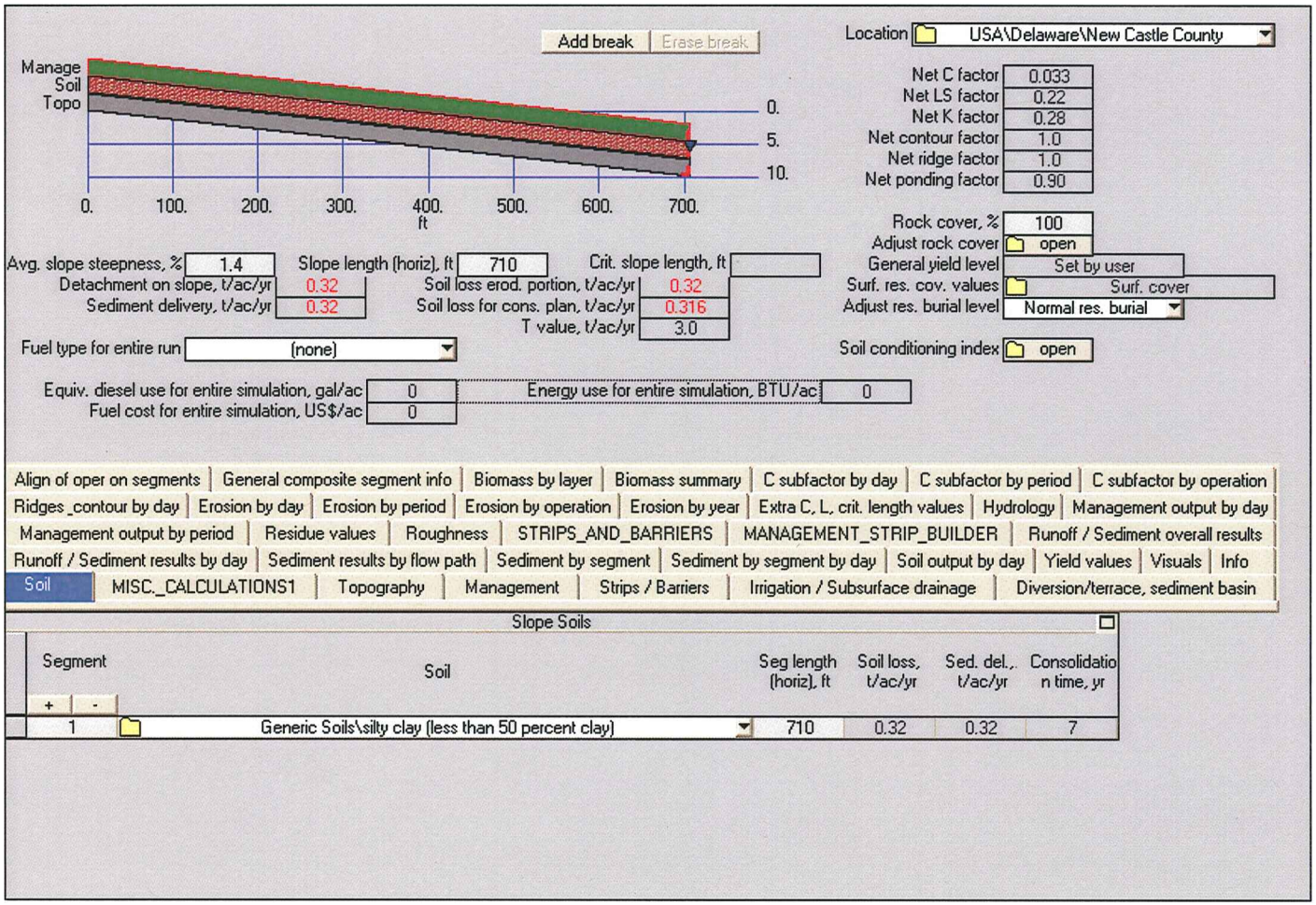
PCB Loading Calculations from the Universal Soil Loss Equation
Purina Tower "A" (Area 1)
Wilmington, DE
DE-1263

Surface PCB Concentration | 0.72 | mg/kg

Symbol	Factor	Value	Units
R	Rainfall/Runoff Erosivity Index	170	10^2 ft-ton in/acre hr
K	Soil Erodibility	0.28	0.01 ton acre hr/ac ft-ton in
	Estimated Slope Length	708	Feet
	Estimated Elevation Difference	10	Feet
	Slope	1.41	Percent (ft/ft)
	Erodeable Area	1.25	Acres
LS	Topographic Factor	0.220	Dimensionless
C	Cover and Management Factor	0.033	Dimensionless
P	Support Practice Factor	1	Dimensionless
	Average Annual Soil Loss	0.32	ton/ac/yr

PCB Loading via Overland Flow | 0.261 | **grams/year - PCBs**

Purina A Overland Flow Calculations (Area 1)



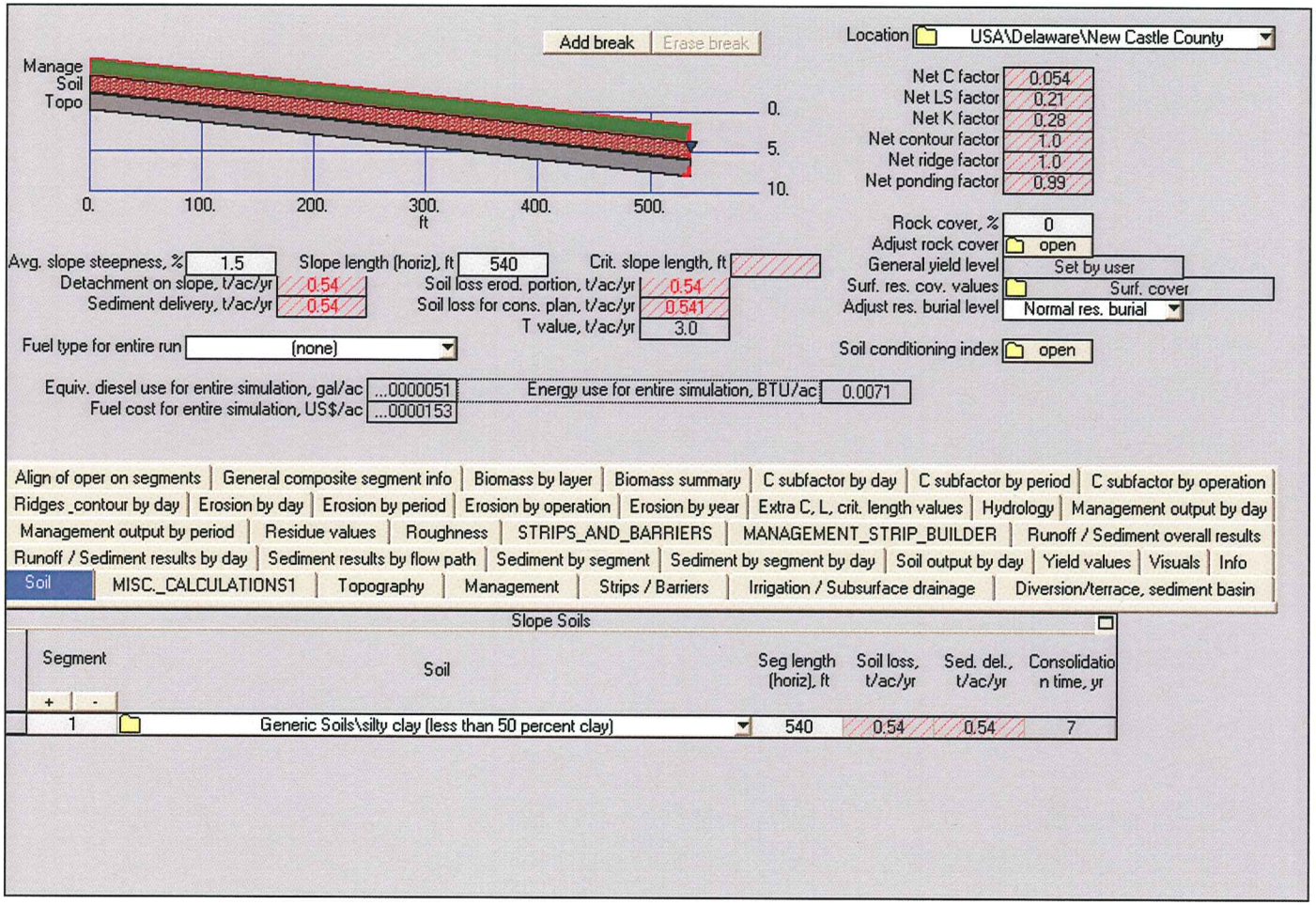
PCB Loading Calculations from the Universal Soil Loss Equation
Purina Tower "A" (Area 2)
Wilmington, DE
DE-1263

Surface PCB Concentration	0.72	mg/kg

Symbol	Factor	Value	Units
R	Rainfall/Runoff Erosivity Index	170	10^2 ft-tonf in/acre hr
K	Soil Erodibility	0.36	0.01 tonf acre hr/ac ft-ton in
	Estimated Slope Length	537	Feet
	Estimated Elevation Difference	8.1	Feet
	Slope	1.51	Percent
	Erodeable Area	0.13	Acres
LS	Topographic Factor	0.230	Dimensionless
C	Cover and Management Factor	0.052	Dimensionless
P	Support Practice Factor	1	Dimensionless
	Average Annual Soil Loss	0.05	ton/ac/yr

PCB Loading via Overland Flow	0.005	**grams/year - PCBs**

Purina A Overland Flow Calculations (Area 2)



File: 0985.26.51

July 2009